BY ORDER OF THE COMMANDER
RAMSTEIN AIR BASE

RAMSTEIN AIR BASE INSTRUCTION 48-102

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Aerospace Medicine

IONIZING RADIATION SAFETY PROGRAM

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements AFPD 48-1, AFI 48-148, *Ionizing Radiation Protection*, AFI 40-201, *Managing Radioactive Materials in the USAF*, AFI 91-108 and USAFE Supplement 91-108, *Air Force Nuclear Weapons Intrinsic Radiation Safety Program*, and AFMAN 48-125, *US Air Force Personnel Dosimetry Program*. This instruction specifies the requirements for protection of 435th Air Base Wing (ABW) and 86th Airlift Wing (86 AW) personnel and their dependents from ionizing radiation, as well as supported units. It also specifies requirements to protect the general public from exposure to ionizing radiation resulting from United States Air Force (USAF) activities. This instruction applies to all Air Force military and civilian personnel working at Ramstein Air Base, as well as 435 ABW annexes and support sites. It does not apply to exposure of patients during diagnostic or therapeutic medical procedures. Implementation of this safety program, and the As Low As Reasonably Achievable (ALARA) concept must not compromise weapons safety, security, reliability, or operational mission considerations. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of in accordance with the Air Force Records Disposition Schedule (RDS) located in Air Force Records Management Systems (AFRIMS): https://www.my.af.mil/gcss-af61/afrims/afrims/index.cfm

SUMMARY OF CHANGES

This publication is revised in its entirety

1. Purpose. This instruction establishes responsibilities, policies, and procedures necessary to protect workers and the community from ionizing radiation hazards, to maintain exposures to ALARA, and to ensure effective monitoring and medical follow-up of personnel. Elements of

the Ramstein AB ionizing radiation safety program include: ALARA, personnel thermoluminescent dosimeters (TLD), electronic personal dosimeters (EPD), radioactive material (RAM) permits, ionizing radiation producing devices, RAM storage areas, RAM shipment/receiving, RAM recycling/disposal, depleted uranium (DU) munitions, and intrinsic radiation (INRAD).

2. Responsibilities

2.1. **435 ABW Commander shall:** Designate, in writing, a qualified individual to be Installation Radiation Safety Officer (RSO) and Alternate RSO.

2.2. **Organizational or Unit Commander shall:**

2.2.1. Identify and obtain approval for new activities or significant changes to activities involving the use/storage of ionizing radiation through the Installation RSO. Provide updates on changes to these activities or mission requirements.

2.2.2. For units potentially exposed to ionizing radiation, designate, in writing, an organizational or unit RSO and alternate, and update as needed. Ensure the most qualified personnel are appointed. The letter must include the rank, name, telephone number, and date estimated return from overseas (DEROS). Send a copy to the appointed individual and to the Installation RSO in the Bioenvironmental Engineering (435 AMDS/SGPB) Flight. The following appointments, at a minimum, should be made:

2.2.2.1. The 435th Medical Support Squadron Commander will appoint a functional area RSO and alternate for Biomedical Equipment Maintenance.

2.2.2.2. The 435th Dental Squadron Commander will appoint a unit RSO and alternate for Dental X-ray.

2.2.2.3. The 86th Maintenance Squadron Commander will appoint:

2.2.2.3.1. A functional area RSO and alternate for Non-Destructive Inspection (NDI).

2.2.2.3.2. A functional area RSO and alternate for Priority Maintenance.

2.2.2.4. The 435th Munitions Squadron (435 MUNS) Commander will appoint a function area RSO and alternate:

2.2.2.4.1. A function area RSO and alternate for Munitions Storage and Inspection.

2.2.2.5. The 835th Civil Engineer Squadron (835 CES) Commander will appoint:

2.2.2.5.1. A permit RSO and alternate permit RSO for Civil Engineering Readiness (CEX) Flight.

2.2.2.5.2. A functional area RSO and alternate for Explosive Ordnance Disposal (EOD) Flight.

2.2.2.6. The 435th Logistic Readiness Squadron (435 LRS) Commander will appoint:

2.2.2.6.1. A functional area RSO and alternate for Storage and Issue.

2.2.2.6.2. A functional area RSO and alternate for Packing and Crating.

2.2.2.7. The 721st Aerial Port Squadron (721 APS) commander will appoint:

2.2.2.7.1. A functional area RSO and alternate for Special Handling.

2.2.2.7.2. A functional area RSO and alternate for Passenger Services.

2.2.2.8. The 435th Security Forces Squadron (435 SFS) Commander will appoint a permit RSO and alternate.

2.2.2.9. The 37th Airlift Squadron Commander will appoint a unit RSO and alternate.

2.2.2.10. The 86th Construction and Training Squadron Commander will appoint a unit RSO and alternate for Readiness/Contingency Training.

2.2.2.11. The 569th US Force Police Squadron Commander will appoint a functional RSO and alternate.

2.2.2.12. The 435th Communication Commander will appoint:

2.2.2.12.1. A functional area RSO and alternate for Ramstein North-Side Post Office.

2.2.2.12.2. A functional area RSO and alternate for Ramstein South-Side Post Office.

2.2.2.12.3. A functional area RSO and alternate for Kapaun Post Office.

2.2.2.12.4. A functional area RSO and alternate for Sembach Post Office.

2.2.2.13. The 2d Air Postal Squadron Commander will appoint a functional RSO and alternate.

2.2.2.14. The 435th Aerospace Medicine Squadron Commander will appoint a permit RSO and alternate for Bioenvironmental Engineering

2.2.2.15. The 435th Medical Operations Squadron Commander will appoint a functional area RSO and alternate for Radiology.

2.2.3. Ensures unit, functional area, or permit RSOs conduct annual radiation safety training for individuals enrolled in the TLD program, anyone who is likely to exceed 10% of the annual external dose limit or 10% of the Annual Limits of Intake (ALI) to include a pregnant radiation worker likely to exceed 500 mrem during gestation or where directed.

2.2.4. Ensures local operating instructions (OI) are maintained and implemented when required by technical order or by the Installation RSO.

2.3. **Installation RSO shall:**

2.3.1. Review plans for new construction or modification of facilities, which involve the use, or storage of radioactive material or radiation-producing devices to ensure personnel exposures are ALARA.

2.3.2. Review, survey, monitor, and document ionizing radiation activities and program elements in accordance with Air Force policy, or as need determines.

2.3.3. Conduct a dosimetry program for personnel whose exposure could exceed 10% of the annual external dose limit or 10% of the ALI or who meet one of the other monitoring

requirements described in AFI 48-148, *Ionizing Radiation Protection* Section 3.5.1. Distribute copies of personnel dosimetry results to functional area RSOs, and ensure notification of ionizing radiation exposure is provided to all monitored individuals.

2.3.4. Train unit, functional area, and permit RSOs as requested.

2.3.5. Review all USAF radioactive material permits applications to include amendments.

2.3.6. Review requests for introduction of new activities or changes to existing activities, which involve the use of ionizing radiation.

2.3.7. Ensure unit, functional area, and permit RSOs are qualified.

2.3.8. Review/approve contractor use of German or Nuclear Regulatory Commission (NRC)-licensed radioactive materials at Ramstein Air Base (AB) or 435 ABW support sites.

2.3.9. Coordinate with and assist users with recycling and/or disposal of all radioactive materials.

2.3.10. Investigate suspected overexposure or abnormal exposure to ionizing radiation.

2.3.11. Determine the need for local Operating Instructions (OI). Review and approve OIs prepared by unit, functional area, and/or permit RSOs.

2.3.12. Annually notify 435 ABW Commander, Fire Chief (835 CES/CEF), 835 CES/CEX and Installation Dangerous Goods Advisor of locations of radioactive material and of any significant moves of radioactive material in a timely fashion.

2.3.13. Periodically review 435 LRS and 721 APS radioactive material shipments logs.

2.3.14. Investigate suspected overexposures with a written report of the investigation submitted through the Major Command (MAJCOM) Bioenvironmental Engineer to United States Air Force School of Aerospace Medicine Occupational/Environmental Health Radiation Dosimetry Laboratory (USAFSAM/OEHH/Radiation Dosimetry Laboratory) and Air Force Medical Support Agency/Bioenvironmental Engineering Division/Radiation Programs (AFMSA/SG3PR).

2.4. **Unit, functional area, and permit RSO shall:**

2.4.1. Complete and submit USAF Radioactive Material Permit applications and amendment requests through the Installation RSO, if applicable.

2.4.2. Consider ALARA when reviewing plans for modification of existing facilities, or design of new facilities involving use of radioactive materials or radiation-producing devices. Obtain approval from the Installation RSO on all projected changes regarding use of radiation-producing devices or radioactive material prior to their implementation.

2.4.2.1. For 435 MUNS, the RSO, Unit Facility Manager and Munitions Supervision will consider ALARA when reviewing plans for modification of existing facilities or design of new facilities involving use of radioactive materials or radiation-producing devices.

2.4.3. Routinely inventory all areas where radioactive materials or radiation-producing devices are used or stored to ensure no unexpected changes occur, and to ensure they remain in accordance with requirements of USAF Radioactive Material Permits and Air Force directives. Inventories should be documented in accordance with the permit and countersigned by the Installation RSO.

2.4.4. Develop and implement local OIs when required to do so by technical order or the Installation RSO. Submit OIs to the Installation RSO for review and endorsement.

2.4.5. Conduct annual radiation safety training, as required. Training resources (i.e. training videos, computer-based training, area-specific training, etc) are available through the Installation RSO. A written training plan specific to radioactive material use within the unit shall be developed/maintained, and approved by the Installation RSO. Document training on an AF Form 55, Employee Safety and Health Record or equivalent, and ensure training documentation is available for review by the Installation RSO upon request. Training shall include, as applicable:

2.4.5.1. Types and characteristics of radiation of concern.

2.4.5.2. Radioactivity, radioactive decay or x-ray production (as appropriate).

2.4.5.3. Modes of exposure-internal vs. external.

2.4.5.4. Health risks posed by exposure including deterministic and stochastic effects and effects on the unborn fetus.

2.4.5.5. General ALARA radiation protection principles.

2.4.5.6. Use of instruments, equipment, and personal dosimetry, as appropriate, to: identify sources of radiation emission; measure radiation exposure rates or dose rates; and monitor individual radiation doses.

2.4.5.7. Emergency procedures.

2.4.5.8. Reporting requirements.

2.4.5.9. RAM permit requirements, as appropriate.

2.4.5.10. Other occupation-specific hazards and the related skills and procedures that are required for working with the RAM or radiation-producing devices of concern.

2.4.6. Follow proper recycling/disposal procedures. Coordinate recycling/disposal through 435 AMDS/SGPB.

2.4.7. Coordinate movement of RAM with Unit Dangerous Goods Advisor.

2.5. **Workplace Supervisors shall:**

2.5.1. Ensure a safe working environment for Airmen, USAF civilians, contractors and the general public regarding ionizing radiation from AF practices.

2.5.2. Ensure personnel are trained on radiation hazards in the workplace and appropriate requirements for protection.

2.5.3. Notify the primary care manager of the declared pregnancy status of workers.

2.5.4. Notify the responsible RSO of changes in practices or procedures involving radiation sources, potential violations of this instruction, unsafe work practices involving radiation sources, or of accidents or incidents involving radiation.

2.5.5. Remove any potentially overexposed individual from all duties involving radiation exposure until completion of the investigation.

2.5.6. Ensure only trained personnel prepare and certify RAM for movement.

2.6. **Individuals (Occupationally Exposed USAF Military, Civilians, and In-house Contractors) shall:**

2.6.1. Properly use dosimeters and personal protection equipment and comply with Commander directed radiation protection programs.

2.6.2. Provide to the unit or Installation RSO such information on their past and current work to include work outside the USAF where they may also incur radiation exposures (IAW 10 CFR20.2104)

2.6.3. Perform operations in a manner that maintains doses ALARA.

2.6.4. Notify workplace supervisors of changes to procedures or operations that could affect exposure or potential violations of safe work practices involving radiation sources including radiation accidents or incidents.

2.6.5. A female military member shall, on becoming aware she is pregnant, notify her workplace supervisor, or primary care manager. A non-military member should notify their workplace supervisor or primary care manager. Note: It is important to remember that a civilian woman's decision to declare her pregnancy is entirely voluntary. It is the fundamental responsibility of the pregnant worker to decide when, and whether she will formally declare her condition.

2.7. **Base Civil Engineer shall:** Ensure the Installation RSO, and other RSOs with a vested interest, review plans for modification of facilities, which involve the use of radioactive material or radiation-producing devices.

2.8. **700 CONS shall:** Review requirements package to ensure it has been reviewed by the Installation RSO when the delivery or use of RAM is involved in contract performance. The contract administrator shall ensure contractor compliance with RAM requirements required by the contract.

2.9. **435 CES Construction Management Offices shall:** Ensure Installation RSO has coordinated on the statement of work for all construction and services contracts potentially involving the use of RAM and/or ionizing radiation producing devices. Ensure contractors using RAM on Air Force installations have Installation RSO approval prior to bringing RAM or radiation-producing devices onto Air Force controlled property. The contractor shall contact the Installation RSO at least 30 days prior to the intended use; so adequate time is provided to ensure proper licensing or permitting.

2.10. **453 MUNS, 435 LRS, and 721 APS shall:**

2.10.1. Follow all applicable Technical Orders (T.O.) and develop written instructions ensuring all radioactive materials are received, stored, packaged, and shipped according to, DOD 4500.9-R, *Defense Transportation Regulation Part II*, USAFEI 24-203, *Safe*

Movement of Hazardous Goods by Surface Modes,Title 10 Code of Federal Regulations (CFR), Title 49 CFR, AFI 24-203 *Preparation and Movement of Air Force Cargo,* and other relevant publications. Bioenvironmental Engineering (BE) shall be notified within three hours of radioactive materials receipt. Priority "999" packages will be surveyed after hours by contacting the BE on-call technician at 0160-5845480 or via Command Post.

2.10.1.1. For 435 MUNS, follow item technical orders, AFI 31-101, *Integrated Defense,* AFMAN 91-201, *Explosives Safety Standards, AFJI 23-504, Radioactive Commodities in the DOD Supply System, AFMAN 24-204, Preparing Hazardous Materials for Military Air Shipments*

2.10.2. Maintain a log of all radioactive shipments and receipts for a minimum of 5 years. This log will contain information required by the Installation RSO.

2.10.3. Maintain an approved temporary storage area for RAM and radioisotope-containing commodities.

2.10.3.1. 435 MUNS will store radioactive munitions in accordance with item T.O., AFI 31-101, *Integrated Defense* and AFMAN 91-201, *Explosive Safety Standards*.

3. Radiation Incidents.

3.1. **Overexposure Incidents.** Notify the Installation RSO (479-2220 during duty hours) immediately; if after hours contact the Bioenvironmental Engineering on call (0160-5845480) or through the command post.

3.2. **Potentially overexposed worker shall:** Report immediately to a primary care manager for a physical examination. The physician will complete SF Form 513, Consultation Request/Report, and generate an AF IMT 190, Occupational Illness/Injury Report.

3.3. **Worker shall:** Immediately notify the unit RSO and supervisor whenever a suspected overexposure or incident occurs. The unit RSO will notify the Installation RSO within 3 hours.

3.4. **Unit RSO shall:** Obtain a signed, narrative statement from the exposed worker and witnesses immediately. The statement will include:

3.4.1. Name, rank, and Social Security Number (SSAN) of exposed worker.

3.4.2. Radiation source - include activity (or power settings if X-ray source).

3.4.3. Brief description of event including exact settings at time of incident.

3.4.4. Length of exposure.

3.4.5. Distance from source.

3.4.6. Description of medical or follow-up action.

3.4.7. Name, rank, and phone number of attending physician.

3.5. **Installation RSO shall:** Make appropriate notifications and coordinate an investigation.

3.6. **RAM Incidents.** AFI 40-201, *Managing Radioactive Materials in the US Air Force* describes reportable incidents in detail. Some potential Examples of reportable incidents include the following: .

3.6.1. Lost, stolen, or otherwise missing radioactive material.

3.6.2. A spill that exposes an individual to an unknown amount of external radiation.

3.6.3. An unplanned or unexpected event involving radioactive materials.

3.6.4. A spill or other unplanned release of radioactive material into the environment.

3.6.5. A defect or damage to a radioactive source or device that presents a potential hazard to personnel or the environment. This includes sealed sources with leak test results in excess of 0.005 microcuries (185 becquerel) of radioactive material.

3.6.6. Known deviations or failure to comply with publications (NRC regulations (10 CFR), DOT regulations (49 CFR), or permit provisions).

3.6.7. Discovery of additional radioactive materials that require a permit, but for which no permit exists.

3.6.8. All levels of radiation or concentrations of radioactive material exceeding 10 times the applicable limit of a USAF permit, a NRC license, or 10 CFR 20.

3.6.9. In restricted areas, levels of radiation in excess of any applicable limit of the permit.

3.7. 435 MUNS will follow AFI 21-201, *Conventional Munitions Maintenance Management*, AFI 31-101 and DoD 5100.76-M, *Physical Security of Sensitive Conventional Arms, Ammunition and Explosives*, for lost, stolen or otherwise missing radioactive munitions and any unplanned or unexpected event involving radioactive munitions materials.

4. Radioactive Recycling/Disposal. Units will coordinate the disposal of all RAM through 435 AMDS/SGPB. Units may not dispose of any quantity of RAM in the Federal Republic of Germany.

5. General Licensed Devices.

5.1. All general licensed devices (ion scanners, vapor tracers, Itemisers, Advanced Portable Detector APD-2000's and environmental chemical agent monitors eCAMs) will be registered with the Installation RSO.

5.2. All general licensed devices require leak testing to be conducted twice per calendar year.

5.3. Transfer of any general license device will be coordinated through the Installation RSO.

6. Quality Assurance, Minimal Requirements.

6.1. Personnel dosimetry action levels serve to determine surveillance and control requirements described in AFMAN 48-125, *Personnel Ionizing Radiation Dosimetry*. Dosimetry results shall be reviewed quarterly by the Installation RSO.

6.2. Annual radiation safety program reviews shall be accomplished by the Installation RSO. Results will be presented to the Aerospace Medicine Council, or equivalent, and the Air Force Occupational Safety and Health Council, or equivalent. Reviews will include:

6.2.1. A review of all local publications, operating instructions, and training plans to ensure they are current.

6.2.2. A review of all radiation survey results for the past year to ensure all required surveys have been performed and documented. The review will verify that appropriate corrective actions have been documented.

6.2.3. A review of all personnel dosimetry results for the past year to evaluate exposure trends to promote ALARA.

6.2.4. An update of the RAM inventory and inventory of radiation-producing devices.

6.2.5. A review of all USAF Radioactive Material Permits to ensure currency and compliance with requirements.

7. Forms Adopted.

AF Form 55, Employee Safety and Health Record

AF IMT 190, Occupational Illness/Injury Report

SF Form 513, Consultation Request/Report

THOMAS F. GOULD, Colonel, USAF
Commander

Attachment 1

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

AFI 21-201, *Conventional Munitions Maintenance Management,* 23 November 2007

AFI 24-203, *Preparation and Movement of Air Force Cargo,* 13 April 2007

AFI 31-101, *Integrated Defense,* 8 October 2009

AFI 40-201, *Managing Radioactive Materials in the US Air Force,* 13 April 2007

AFI 48-148, *Ionizing Radiation Protection,* 3 June 2008

AFI 91-108, *Air Force Nuclear Weapons Intrinsic Radiation Safety Program,* 29 November 1993

AFJI 23-504, *Radioactive Commodities in the DoD System,* 19 April 1985

AFMAN 24-204, *Preparing Hazardous Materials For Military Air Shipments,* 1 September 2009

AFMAN 48-125, *Personnel Ionizing Radiation Dosimetry,* 7 August 2006

AFMAN 91-201, *Explosives Safety Standards,* 17 November 2008

DOD4500.9-R, *Defense Transportation Regulation Part II,* June 2008

DOD5100.76-M, *Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives,* 12 August 2000

USAFEI 24-203, *Safe Movement of Hazardous Goods By Surface Modes,* 1 May 2003

AFI 91-108_USAFESUP 91-108, *Air Force Nuclear Weapons Intrinsic Radiation Safety Program,* 1 March 2007

Abbreviations and Acronyms

ABW— Air Base Wing

ALARA— As Low As Reasonably Achievable

ALI— Annual Limits of Intake

NRC— Nuclear Regulatory Commission

OI— Operating Instruction

RAM— Radioactive Material

RSO— Radiation Safety Officer

USAF— United States Air Force

Attachment 2

RADIATION EXPOSURE LIMITS

A2.1. The doses listed below are taken from 10 CFR 20 and is the absolute maximum dose that can be received.

Table A2.1. Radiation Exposure Limits

Application	**Occupational**	**Declared Pregnant Females**	**Minors Yearly (16-18 years)**	**Adult ALARA Yearly**
Total Effective Dose Equivalent (Whole Body)	50 mSv (5 rems) in a single year, and 500 mSv (50 rems) to any tissue, except lens of the eye	5 mSv (0.5 rems) for remainder of pregnancy to the embryo/fetus, avoiding substantial variation from a uniform monthly exposure rate	5 mSv (0.5 rems) per year 50 mSv (5 rems) to any tissue, except lens of the eye	1 mSv (0.1 rems) in a year
Lens of Eye	150 mSv (15 rems)		15 mSv (1.5 rems)	
Skin and Extremities	500 mSv (50 rems)		50 mSv (5 rems)	

A2.2. Annual dose limits are based on the requirements of 10 CFR 20.

A2.3. The Action Level for Ramstein AB is set at 0.05 rems for occupational Total Effective Dose Equivalent (TEDE) but may be set lower at the discretion of the Installation RSO.

A2.4. Contingency Action Level. NATO Standardization 2473 (NATO Stanag 2473) Agreement is the basis for Operational Dose Guidance for Interventions and is referenced in Attachment 7 of AFI 48-148.